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Reevaluation of *Tropidopathes saliciformis* Silberfeld: A hydroid originally identified as an antipatharian coral

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Abstract.—Tropidopathes saliciformis Silberfeld (1909) was originally identified as an antipatharian coral growing over a hydroid colony. A re-examination of the type specimen revealed no evidence of any antipatharian skeletal material on the hydroid, and it is assumed that the lower parts of the hydrocauli of the hydroid, which lacked hydrocladia, had been mistaken for antipatharian sclerenchyme. The hydroid was subsequently identified by Stechow (1913) as *Halicornaria ishikawai* Stechow, 1907 (now known as *Gymnangium ishikawai*). Therefore, the genus *Tropidopathes* is herein removed from the Antipatharia, and for nomenclatural purposes, *Tropidopathes saliciformis* Silberfeld is considered a junior subjective synonym of *Gymnangium ishikawai* (Stechow).

In 1909, Silberfeld described a new genus and new species of antipatharian coral, *Tropidopathes saliciformis.* She reported that it was growing over a hydroid colony, and because of the epizotic habit, she referred the genus to the subtribe Crustosae which had been established by Schultze (1896) for *Savagliopsis pedata* (Gray). Brook (1889) had reported that the lower parts of the corallum of the type specimen of *Antipathes pedata* Gray appeared to be growing over a gorgonian axis, and Schultze (1896) considered this sufficient reason for establishing a new genus for the species. (NOTE: recent re-examination of the type specimen of *A. pedata* deposited in the Natural History Museum, London, revealed no evidence of an epizotic habit). In Schultze's revised classification of the Antipatharia, the subtribe Crustosae was placed in an unnamed tribe characterized by the lack of peristomal folds; the tribe was placed in the subfamily Dekamerota (characterized by polyps with ten septa); and the subfamily was placed in the family Antipathidae. Van Pesch (1914) applied the name Apuchaephora to Schultze's un-named tribe containing the Crustosae. Pax (1918, 1987) did not recognize Schultze's subdivisions of the family and, although he retained *Tropidopathes* as one of seven genera in the Antipathidae, he noted that the systematic position of the genus was unclear. There is no evidence that any later antipatharian worker had re-examined the type specimen of *Tropidopathes saliciformis* after Silberfeld's original description appeared in 1909.

In Silberfeld's description of *Tropidopathes saliciformis,* she mentions that the branches of the antipatharian arise singly from a reticulum ("Geflecht") which is also overgrown by bryozoans, sponges, and balanids. She reported that the branches were light brown in color, reached a maximum length of 14 cm, and that each had two rows of very thick spines. The spines were described as being 285 μm wide at the base, up to 357 μm in height, rounded at the apex, and up to 535 μm apart in the same row. She further reported that on the side opposite the spines, there was a long crest-like ridge, 178 μm in thickness. The illustrations given by Silberfeld (1909, figs. 3–4) showed protuberances on either side of

the stem which were arranged bilaterally and alternately. These protuberances differed from typical antipatharian spines in that they appeared slightly concave on one side.

Re-examination of the type specimen.—Figure 1 shows the complete holotype of *Tropidopathes saliciformis* Silberfeld in the collections of the Zoologische Staatssammlung Muenchen. Numerous unbranched "stems" arise from a tangled hydrorhizal mass. At the top of some of these "stems" there are small pinnately branched structures that Silberfeld had identified as a hydroid (Fig. 2A). A close examination of one stem (Fig. 2B) reveals that Silberfeld had mistakenly identified the apophyses of the hydrocauli of the hydroid as antipatharian spines. Associated with each apophysis are three openings on the hydrocaulus corresponding to cauline nematothecae. The hydroid was subsequently identified by Stechow (1913) as *Halicornaria ishikawai* Stechow, 1907. A complete redescription of the hydroid is given below.

Systematic Treatment

Plumularioidea McCrady, 1859
Aglaopheniidae Marktanner-Turneretscher, 1890
Gymnangiinae Calder, 1997
Gymnangium ishikawai (Stechow, 1907)
Figs. 1–3

?*Aglaophenia balei* Marktanner-Turneretscher, 1890:272, pl. 7, figs. 19–20 (sensu Ritchie, 1910:22–23, pl. 4, fig. 12 (see Stechow, 1913).
?*Halicornaria flava* Nutting, 1905:955, pl. 13, figs. 11–12 (see Stechow, 1913).
Halicornaria ishikawai Stechow, 1907: 198; 1909:100–101; 1913:95.
Tropidopathes saliciformis Silberfeld, 1909:19–20, figs 3–4.
Gymnangium ishikawai.-Stechow, 1923:19; Yamada, 1959:84; Hirohito, 1995:290.

Material examined.—Zoologische Staatssammlung Muenchen, No. 121a of the collection of Doflein, Japan, Sagami Bay, near Jogashima Island, 150 m, 31 Oct 1904; holotype of *Tropidopathes saliciformis* Silberfeld (1909) (schizoholotype, USNM 100479).

Description.—Unbranched monosiphonic hydrocauli arising from complex rootlike hydrorhiza (Fig. 1). Hydrocauli up to 14 cm long and up to 520 μm in diameter; separated into internodes about 900 μm in length by faint diagonal constrictions. Each internode with two frontal lateral hydrocladial apophyses (Fig. 2). Apophyses distally inclined, alternately arranged; surrounded at base by three cauline nematothecae, one median inferior and two axillary (Fig. 2B). Frontal axillary nematotheca very wide, leaf-like. Longitudinal crest extending down hydrocauli on side opposite apophyses. Hydrocladia present at top of some, but not all hydrocauli. Hydrocladia simple, in two rows, bilaterally arranged. Hydrothecae in single series on inner side of hydrocladia (Fig. 3A). Upper part of hydrotheca tube-shaped in lateral view (Fig. 3B); margins flared outward, usually forming a single weak cusp on each lateral side; adcauline margin straight or slightly concave: abcauline margin convex. Hydrothecal aperture approximately 160 μm in diameter from adcauline to abcauline wall. Each hydrotheca with three nematothecae; one median inferior, and two lateral (Fig. 3A, B). Median inferior nematotheca tube-like in shape, narrowing at apex; lateral nematothecae bowl-shaped and relatively wide at apex. Terminal aperture of median inferior nematotheca facing distally; apertures of lateral nematothecae facing distally and somewhat medially (i.e., towards each other). Distal side of median inferior nematotheca mostly free, not adnate to the abcauline wall of hydrotheca, and not extending beyond abcauline margin of hydrotheca. Abcauline intrathecal septum extending about a third of the way across interior cavity of hydrotheca. Distinct crest-like ridge extending down the side of the hydrocladia di-

Fig. 1. *Gymnangium ishikawai* (Stechow). Holotype of *Tropidopathes saliciformis* Silberfeld (1909); approximately 15 cm tall.

rectly opposite side on which hydrothecae occur. Gonosomes not present.

Remarks.—The length of the hydrocauli (maximum 14 cm) and the size, shape and spacing of the apophyses match very closely the description given by Silberfeld of the "antipatharian" *Tropidopathes saliciformis,* and there is little doubt that Silberfeld was describing the lower parts of the hydroid colony as an antipatharian. In 1913 Stechow identified the hydroid as *Halicornaria ishikawai* Stechow (1907), and listed as the "Untergrund" or substrate, the antipatharian *Tropidopathes saliciformis,* in contradiction to Silberfeld's description of the hydroid being the substrate for the antipatharian. Stechow apparently did not review Silberfeld's original description.

Comparisons.—When Stechow (1913) identified Silberfeld's specimen as *Halicornaria ishikawai* (Stechow), he noted that the median inferior nematothecae were sig-

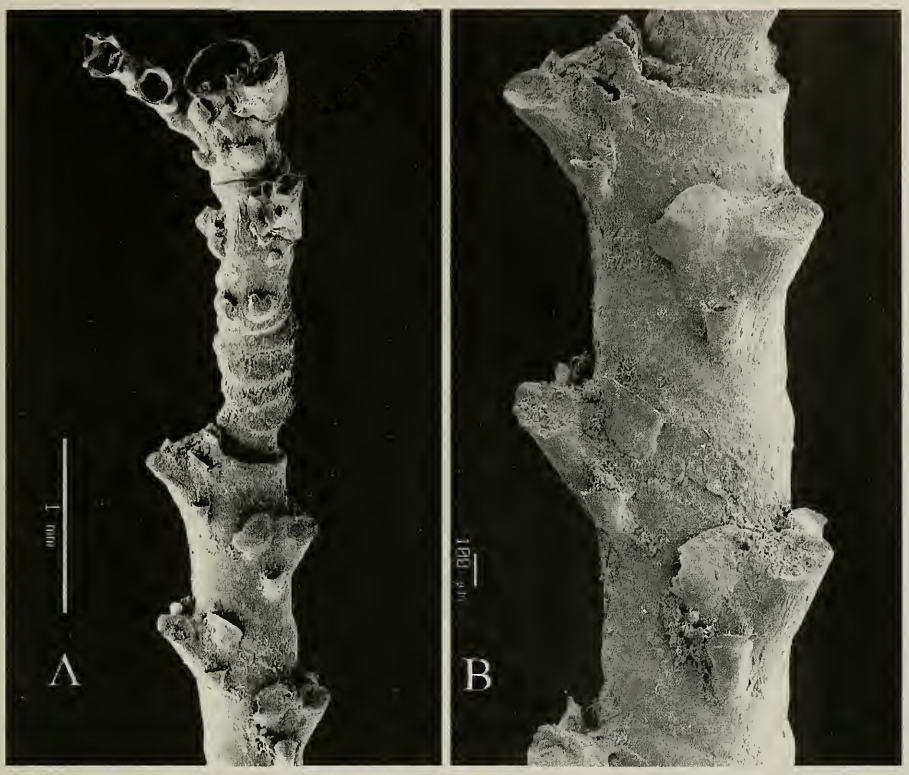

Fig. 2. *Gymnangium ishikawai* (Stechow); schizoholotype of *Tropidopathes saliciformis* Silberfeld (1909), USNM 100479. A, Upper part of hydrocaulus showing basal part of one hydrocladia. B, Enlarged view of hydrocaulus.

nificantly shorter than those in the type specimen of *H. ishikawai* that he had illustrated in 1909. Because of this, Stechow (1913) suspected that the specimen might be referrable to *Aglaophenia balei* Marktanner-Turneretscher, 1890, as described by Ritchie (1910), or to *Halicornaria flava* Nutting, 1905. Stechow (1913), however, also mentioned that the margin of the hydrotheca in *H. ishikawai* was less serrated than in either of these two species; in particular, he noted that there was no denticle on the front or back central areas as described by Nutting.

Gymnangium balei (Marktanner-Turneretscher) was synonomized with *G. hians* (Busk) by Vervoort & Vasseur (1977). In describing a specimen of *G. hians,* Rees & Vervoort (1987) note that the length of the medial nematotheca varied considerably depending on its location on the hydrocladium (usually longer on the part of the hydrocladium closest to the hydrocaulus). In the specimen of *G. hians* described by Vervoort & Vasseur (1977), the hydrothecal margin was reported to have only a single cusp on either side, similar to the situation in *G. ishikawai*; however, in the specimen of *G. hians* described by Rees & Vervoort (1987), the hydrothecal margin was reported to have three cusps on either side. As noted by Calder (1997), not only the length of the median inferior nematotheca, but also the dentition of the hydrothecal margin are quite variable in species of *Gymnangium.* Hirohito (1995) reported and illustrated material of *G. ishikawai* and *G. hians* from Sagami Bay, Japan. Both species were described as having median inferior nematothecae extending beyond the hydrothecal

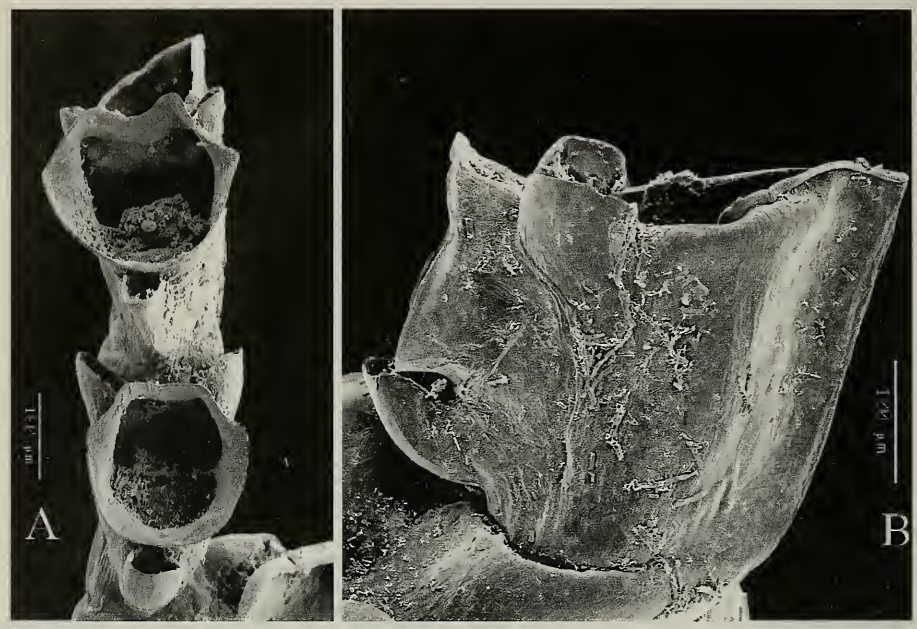

Fig. 3. *Gymnangium ishikawai* (Stechow); upper part of the schizoholotype of *Tropidopathes saliciformis* Silberfeld (1909), USNM 100479. A, Lower portion of hydrocladium, frontal view with two hydrotheca. B, Lateral view of hydrocladium showing a single hydrotheca and associated nematotheca.

margin; differentiated mainly on the basis of the serration of the hydrothecal margin (inconspicuous in *G. ishikawai,* and very conspicuous in *G. hians*). According to Calder (personal communication), *G. ishikawai* is distinct from *G. hians* Busk. In the type material of *Tropidopathes saliciformis* the dentition along the hydrothecal margin is relatively weak, suggesting that Silberfeld's specimen should be referred to *G. ishikawai,* however, the median inferior nematotheca is relatively short and its adcauline side is not adnate to the abcauline hydrothecal body wall, suggesting that Silbereld's specimen may be distinct from both *G. ishikawai* and *G. hians.*

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